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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR OCTOBER 1939

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FRUIT INSECT INVESTIGATIONS

Ethylene dichloride toxic to apple but safe on plum.--Oliver I. Snapp, of the Fort Valley, Ga., laboratory, reports that ethylene dichloride emulsion is toxic to apple trees. In recent tests the strength and dosage of ethylene dichloride (1/2 pint of 20-percent emulsion), used safely on peach trees, seriously injured 8- and 14-year-old apple trees. According to tests conducted this fall, ethylene dichloride emulsion is as safe on plum trees as on peach when used for the control of the peach borer, no injury having resulted from the use of 1/2 pint of 20- and 25-percent emulsions on 5-, 7-, and 9-year-old plum trees.

Survey of pear psylla in Washington.--In the News Letter for August 1939 (v. 6, No. 10, p. 2) mention was made of the finding of the pear psylla (*Psyllia pyricola* Foerst.) in the Pacific Northwest, and of plans for a cooperative survey. This survey, conducted jointly by the Washington Experiment Station, the State Department of Agriculture, and the Bureau of Entomology and Plant Quarantine, to determine whether the psylla exists elsewhere in the State than in Spokane County, has been completed. Eleven counties, containing 96.5 percent of the pear trees in the State, were surveyed, and 24,300 individual trees growing on 2,880 acres, were examined. No evidence of the psylla was found on any of these trees. In addition to this, packing-house workers were asked to bring in any pears coming to their notice which looked as though they might be injured by the psylla. A number of pears were brought in showing injury very similar to that resulting from the honeydew that the psylla produces. In each case the orchard from which the pears came was examined carefully and no evidence of psylla found. There was evidence that this type of injury can be caused by juice dripping from a wormy pear onto another pear hanging below it.

Colonization of milky disease of Japanese beetle larvae.--R. T. White and S. R. Dutky, of the Japanese beetle laboratory, Moorestown, N. J., have reported on the field colonization of the milky disease of Japanese beetle larvae in New Jersey. The work was carried on in cooperation with the Division of Japanese Beetle Control and the New Jersey State Department of Agriculture, and included distribution of the nematode *Neoaplectana glaseri* and the type A milky disease organism. The milky disease organism was applied at the rate of 2 grams of the spore-talc mixture every 10 feet, by "spot" application, each gram of mixture containing 100 million type A spores. Approximately 1 acre was treated at each colony site, averaging 1.75 pounds of the spore-talc mixture at each site. By the end of the fall treating season (October 18), the treatment had been applied at 161 points in New Jersey, in the counties of Mercer, Monmouth, Middlesex, Hunterdon, Somerset, and Union.

MEXICAN FRUITFLY CONTROL

Few fruitflies left in the valley.--Only two Anastrepha ludens Loew were trapped in the Rio Grande Valley in October. These came from the western end of the valley where the infestation was heaviest last year. Trap records indicate that few, if any, of last year's flies remain in the area to cause an early infestation this season. Harvesting of fruit for shipment began on October 2 but fruit from only a small number of groves would pass the State maturity requirements at that time. Shipments were below normal for the month; however, requests for harvesting permits were becoming more numerous before the end of the period. The absence of general fall rains is seriously retarding the development of the fruit crop.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Probable hibernacula of Bruchus brachialis Fahr. in western Oregon.--On November 2, Max M. Reeher and L. P. Rockwood, Forest Grove, Oreg., reported that on April 20, 1939, it was observed that the first vetch weevils to appear in a field of hairy vetch that had been infested by weevils in 1938 near Wilsonville, Oreg., were concentrated under a lone oak tree on the east edge of the field. On October 13 an examination of the lower 10 to 12 feet of this oak was made. Under the moss on the trunk and main limbs, 2 B. brachialis, male and female (dead of fungous disease), were found. Under and among the lichens, mostly on dead limbs, 4 living B. brachialis, 2 males and 2 females, were collected and others were seen. Pea weevils (B. pisorum L.) but no vetch weevils were found in cracks of old telephone poles and in crevices of the bark of trees near this field. In all instances the weevils were completely quiescent until disturbed, even though the air temperature was 75° F. or above. Samples, about equal in bulk, of both the moss and the lichen were taken from the oak above referred to for later examination. In the collection of moss were found: 5 B. brachialis, 3 males (1 dead of fungous disease) and 2 females; 10 B. pisorum (4 dead). In the sample of lichen, which weighed 2 ounces and included a few small oak twigs, were found: 19 B. brachialis, 10 males and 9 females, all alive; 4 B. pisorum, all alive; and 1 Acanthoscelides pauperculus (Lec.), alive. The 2 dead B. brachialis males from the moss developed a luxuriant growth of Beauveria globulifera in a moist chamber and had doubtless been killed recently by this entomogenous fungus. The moss becomes saturated with moisture in rainy weather, whereas the lichen does not. Apparently the lichens on the oak trees are favorable hibernation places for B. brachialis in western Oregon, as Larson and Hinman found them to be for B. pisorum (Jour. Econ. Ent. v. 24, No. 5, p. 967, 1931) and other insects (Proc. Ent. Soc. Wash. v. 34, No. 3, pp. 43-44, 1932).

Field test of insecticides for control of European corn borer in sweet corn.--D. D. Questel, Toledo, Ohio, reports that the field program for the insecticidal control of the European corn borer in early market sweet corn at Toledo, Ohio, in 1939 was directed principally toward comparisons of (1) spray combinations of ground derris, synthetic and natural cryolite, and new preparations supplied through the Division of Insecticide Investigations; (2) dust combinations of cryolite with carriers of various types; and (3) dust preparations of nicotine, ground derris root, and synthetic cryolite. Four applications of the spray combinations were made at 5-day intervals, the material being applied by hand at 175-pounds pressure and at rates of from 120 to 150 gallons per acre, depending on the size of plants at time of application. Ground derris root and the cryolites were outstanding in the protection they afforded the plants, all spray combinations of these materials giving over 90-percent reduction in populations in both ears and plants, as compared with the number of borers in the checks. However, plant injury accompanied the cryolite applications. All new materials tested reduced borer populations significantly below those in the nontreated plats. Conclusive interpretations of the performance of the various dust treatments are not possible because of excessive rainfall during the hatching period of the borer which permitted only three applications of the dust. However, in the dust-carrier experiment, which utilized walnut-shell flour, gypsum, wheat flour, precipitated calcium carbonate (extra light, extra heavy, and medium weights), celite and Wyoming bentonite clay as carriers with synthetic cryolite, significant reductions in borer populations in the ears and plants were obtained and the trend of the data indicated that walnut-shell flour holds considerable promise as a satisfactory carrier. Ground derris, synthetic cryolite and dual fixed nicotine applied in dust combinations with Wyoming bentonite clay, three applications of 50 pounds per acre each at 5-day intervals and applied with a power duster using three nozzles per row, gave significant reductions in borer populations in both ears and plants, derris being somewhat more effective than the other materials. The various dust combinations, however, gave much less plant protection than did spray preparations containing the same active agents. Efforts to buffer the characteristic burning action of cryolite, when applied to sweet corn by the addition of magnesium oxide, soybean oil or meal, dried blood or calcium compounds, met with little success and no satisfactory method of eliminating this serious disadvantage of cryolite was found.

JAPANESE BEETLE CONTROL

Large acreage treated with lead arsenate.--During October 231 acres of soil was covered in soil-treating programs in 14 cities in 4 States. Soil treating in Chicago, begun on July 1, was concluded on October 19. Treatments in Indiana covered 14.7 acres in Fort Wayne, 18.4 acres in Logansport, and 13.3 acres in Whiting. One acre of soil was sprayed in Dearborn, Mich. Treating in Detroit, Mich., started on September 25 and continued through October and into November, with 31.8 acres covered during October. On October 7, 1.2 acres of soil was treated in Highland Park, Mich. The final treatment in Michigan during the month was made at Melvindale, where 2.6 acres was sprayed. Dearborn, Highland Park, and Melvindale are all suburbs of Detroit. In North Carolina, 12.6 acres was treated in Elizabeth City, 48.3 acres in Greensboro, 10.2 acres in Rocky Mount, 1.1 acres in Wilmington, 2 acres in Wilson, and 51.6 acres in Winston-Salem. Treatments in Wilson and Winston-Salem are being continued into November.

Methyl bromide fumigation demonstrations continue.--On October 3 the Division's portable 50 cubic foot methyl bromide fumigation chamber was demonstrated at a nursery at Towson, Md. Attending the demonstration were representatives from over 20 nursery and greenhouse establishments in Maryland and the District of Columbia. E. N. Cory and G. S. Langford, of the University of Maryland, and Maryland State Forester H. J. Howell, were also present. Plants fumigated consisted of evergreens, ferns, gardenias, begonias, snapdragons, peperomia, poinsettias, St. Paulia, pandanus, philodendron, and crassulas. Carmine begonias in 6-inch pots were injured, and the young growth on the tips of some of the ferns were slightly burned; otherwise, no damage was reported. A second demonstration in Maryland was made on October 4 at Hagerstown for the benefit of the growers in the western part of the State. This demonstration was also well attended and the results of the fumigation were successful. The methyl bromide fumigation chamber built by one of the large hydrangea growers in the Baltimore area was kept in almost constant use during October. Hydrangeas fumigated totaled 36,825 in pots ranging from 3 to 7 inches. All treatments to date have been successful. This 1,000 cubic foot chamber will hold 7,000 3-inch potted stock or 3,500 4-inch potted stock. Fumigation demonstrations were also staged during the month at 2 establishments on Long Island. The New Jersey district office is cooperating with the Division of Control Investigations in tests with methyl bromide as a fumigant against the European corn borer.

Certifications above normal in Long Island, N. Y., area.--Fall inspections have been numerous enough in the Long Island area to indicate an above-normal amount of business. One carload of nursery stock comprised of 85 various sizes of yew trees from a private estate was fumigated with carbon disulphide and then certified for shipment to the State of Michigan. Methyl bromide fumigation of 20,000 clumps of spirea was started at a nursery establishment. After fumigation the clumps will be set in sand over a treated and certified plot. As soon as the ground is frozen, the clumps will be removed and used to fill orders already on hand for the entire lot. Inspection was also started on 50,000 chrysanthemum roots and plants to be shipped by 2 establishments to Florida for further field productions of cut flowers in that State.

New Jersey nursery industry.--Orders for spring shipments from several of the New Jersey nursery establishments are reported as considerably in excess of last year. This has resulted in the supervision of cleaning of large quantities of stock preparatory to its heeling-in in certified lead-arsenate-treated plots. One South Jersey nursery shipped 2 carloads containing over 1,000 evergreens dug from lead-arsenate-treated plots.

Dual-purpose inspection.--Careful washing of roots of strawberry plants and their examination for the presence of red seal, a root disease, is simplifying Japanese beetle quarantine inspection of these plants for a large grower at Salisbury, Md. The grower has a special arrangement whereby nozzles from his sprayers have been adapted to the washing of the strawberry plants. Red seal disease caused heavy losses to the strawberry growers in the Salisbury area last year. By careful selection of soil and the elimination of infected plants, the growers claim that the disease can be eliminated within a few years.

Governors' roses inspected.--At the close of the New York World's Fair, gift packages of roses were shipped by one of the State exhibitors to the Governor of each State. These were properly inspected and certified under the Japanese beetle quarantine regulations. Prior to closing of the fair on October 31, the manager of each State exhibit was visited by an inspector who furnished quarantine information and anticipated any irregularities that might result from the return of plant material to distant States.

District inspector confers with Canadian officials.--Late in October, H. B. Ward, district supervisor in charge of the Syracuse, N. Y., Japanese beetle district office, conferred with representatives of the Plant Inspection Service of the Canadian Department of Agriculture to discuss Japanese beetle quarantine regulations as they apply to plant material offered for entry into Canada.

Late beetle reports.--An inspector of the New York City area reported the collection of 150 beetles and the observation of hundreds of additional beetles at Bedford, Westchester County, N. Y., on October 10. The temperature was 80° F. and the beetles were as active as at any time during the summer. October 10 was also the latest date on which adults were observed in Connecticut, several specimens having been collected on that day in New Haven.

Results of municipal Japanese beetle trapping.--L. F. Prouty, of the Springfield, Mass., park department reported that 700,000 beetles were trapped in 1,650 traps operated last summer in that city. R. A. Sibley, of West Springfield, reported that 270 traps set in West Springfield caught a total of 136,732 beetles.

Hundreds of gypsy moth egg clusters removed.--Lumber, pulpwood, logs, crating, birch-bark novelties, contractor's equipment, balsam tips, and nursery stock were among the infested articles inspected in October. From 35 lots of infested material, 149 egg clusters were removed after creosoting. The most distant shipment in which infestation was found consisted of 3 cartons of birch novelties destined to East St. Louis, Ill. Three gypsy moth egg clusters were removed from these novelties. Forty-six egg masses were removed from 8 carloads of lumber bound for Camden, N. J. Inspection of a truckload of lumber at Danville Junction, Maine, prior to transportation to Morrisburg, Ontario, Canada, disclosed 3 egg clusters. Fourteen egg masses were taken from 2 carloads of lumber shipped to Suspension Bridge and Buffalo, N. Y. In addition to the egg clusters removed from articles just prior to their shipment, 737 egg clusters were found on 44 cords of grey birchwood inspected at Dixfield, Maine, for later use in the manufacture of candlestick and other Christmas novelties to be shipped to a chain of stores throughout the United States. Also, at Fryeburg, Maine, 14 egg masses were found on a quarter-cord of birch logs examined before they were made into novelties intended for distribution in noninfested States. Record shipments of lumber were reported from western Massachusetts, New Hampshire, and Maine.

Christmas tree cutting under way.--Cutting of Christmas trees began in central Vermont on October 16. The first trees to be certified this season consisted of 270 trees inspected and certified at Danville, Vt., for truck movement to Bethlehem, Pa. A large number of woodlots from which evergreen boughs will be collected for the Christmas trade were inspected in the lightly infested sections of western Massachusetts and southern Vermont. Manufacturers of Christmas wreaths, roping, and decorative pieces were busy late in October gathering greenery, cones, red berries, and similar material and assembling them for inspection before manufacturing operations were started.

Temporary inspectors assist in gypsy moth inspections.--During October 11 temporary inspectors were added to the force in Connecticut and Massachusetts. Their principal assignment was the inspection of nursery stock going into winter storage. As some of the nurseries are infested with the Japanese beetle, as well as the gypsy moth, it was necessary to see that the stock was not only free from gypsy moth egg clusters but that the roots were also free from soil.

Crews shifted to elm-sanitation activities.--At the beginning of the October work period, W. P. A. personnel engaged in Dutch elm disease eradication work was reorganized for the fall elm-sanitation program. In Connecticut the personnel previously engaged in systematic scouting was changed to some form of sanitation work. A few New Jersey crews continued the tagging of elm trees likely to become infested with bark beetles, but most of the men were transferred to the removal of trees included in the sanitizing program. Crews employed by New York State continued scouting for beetle material. Eradication crews in New Jersey worked in almost every infected county in the State removing trees found infested with elm bark beetle carriers of the fungus, as well as destroying any residue of disease-infected trees still standing. Five of the W. P. A. crews working in New York were concentrated in the swamp area at Ancramdale, Columbia County, the northernmost infection center east of the Hudson River. Among the assignments of sanitation crews in Pennsylvania was the clear cutting of a disease center near New Hope, Bucks County.

Four autogiros grounded.--All aerial scouting operations in connection with the Dutch elm disease eradication program were discontinued for the season during the week ended October 21. Four ships were returned to the U. S. D. A. airport at Preakness, N. J., where they will be checked over in advance of major overhauling scheduled for the winter. On October 19 the services of a pilot and the Division's 160-hp. autogiro were lent to the Division of Plant Disease Control. The ship flew from Preakness to Ripley, N. Y., to engage in an aerial survey to map white pine areas in western New York in connection with control of the white pine blister rust. At the airport considerable floor space in the hangar was cleared and made available for dead storage of 50 trucks used in last summer's scouting operations.

First-record Dutch elm disease infection.--Confirmation was received during the month covering an elm in the town of Hamden, New Haven County, Conn. This infection is less than 1,000 feet from the site of the tree previously found infected in the town of North Haven. At this particular point the Hamden-New Haven town line is in the center of Mt. Carmel Avenue. The newly confirmed tree is across the street from the infected group of trees. When this infected tree was removed, two nearby elms were found infected with Scolytus multistriatus Marsham. Specimens of the bark beetles were collected and forwarded to the Bloomfield culture laboratory to determine whether they bore the disease fungus.

FOREST INSECT INVESTIGATIONS

Chemicals not effective as log sprays.--H. A. Bess, New Haven, Conn., reports that field tests were made during the past summer at Harvard Forest, Petersham, Mass., to determine whether certain chemical sprays would be effective against insects that cause damage to logs in dry storage. Thirty-three decks of approximately 50 logs each were used in the study, and over a dozen different sprays were applied by B. H. Wilford, of the Asheville, N. C., laboratory. Recently an examination was made of the logs and it was found that none of the sprays had proved to be effective, especially against bark beetles, which were abundant in all decks. Sawyers, however, were more numerous in the unsprayed check decks than in the sprayed ones.

Insects damage hurricane-felled timber.--H. R. Dodge, New Haven, says that during July, August, and a part of September considerable time was spent in examining hurricane-felled white pine in Massachusetts to determine the extent and nature of insect attack. Observations were confined principally to this tree species, because it constituted probably at least 90 percent of the merchantable timber blown down in this area. The examination was primarily of logs which had been purchased by the Northeastern Timber Salvage Administration of the United States Forest Service and held in dry sites preparatory to sawing. In the latter months, however, attention was given to logs in ponds, and the logged and unlogged blow-down areas in the woods. Insect conditions did not seem serious in July, and in lumber sawed prior to August 1 there was very little damage caused by *Monochamus*, ambrosia beetles, or blue stain. Late in August there was an appreciable increase of infestation by bark beetles and *Monochamus*, and at a few sites damage by the latter was commonly encountered in the sawed lumber. The heaviest infestation by ambrosia beetles noted in July was 1.42 percent of the logs at one site, and in August the percentage had increased to 5.71. Similar figures for *Monochamus* were 2.61 percent in July and 10.51 percent in August. It is probable that in the case of *Monochamus* many infested logs were overlooked in the July examination because the larvae were too small to push out borings. Buprestid larvae were not uncommon, but their damage was considered slight. There was evidence from observations on *Monochamus* that the insects in some cases had infested the logs in the woods prior to removal to dry sites, while in other cases they had infested the logs at the site by flight from adjacent woodlands. As would be expected, the larger the volume of logs the more sparse was the insect population. The Moulton field at West Concord was remarkably free of insects, and this was probably due to the fact that the logs were all removed from the woods during the dormant season, and the site was well removed from pine woodlands which might have served as centers of infestation. Floating logs were in good condition and free from stain, although in some logs bark beetles had successfully reproduced under the bark on the upper side. In the woods some of the wind-thrown trees, which had part of their roots in the soil, were still in good condition a year after the storm, but most timber of merchantable size had died from the effects of insect attack, sunscald, drought, or a combination of these factors. The insects attacking green trees were largely *Ips calligraphus* Germ. and *Ips pini* (Say), and these may be expected to kill some standing timber adjacent to wind-thrown areas and mills next year. *Orthotomicus caelatus* Eich. was the most common bark beetle found in the logs. *Gnathotrichus materiarius* Fitch and *Xyleborus* sp. were the ambrosia beetles most frequently encountered. Buprestid larvae were common but adults were rarely seen, therefore it is concluded that they had passed the peak of adult activity before observations were begun.

Chemically killed elm trees resist insect attack.--R. R. Whitten, Morristown, N. J., reports that in June a large series of living elm trees were injected with solutions of sodium arsenite and ammonium bifluoride, using the rubber-collar method. The sodium arsenite was applied at the rate of 15 and 30 grams per inch of diameter (breast-high) and the ammonium bifluoride at the rate of 5, 10, and 15 grams per inch. One hundred trees between 6 and 20 inches in diameter were treated with each dosage at an average rate of 1.95 trees per man-hour of labor. Late in August all of the above trees were examined for sprouting. The results of this survey are presented in the following table.

Chemical	Dosage per inch	Trees sprouting		
		Total	Weak	Vigorous
	Grams	Percent	Percent	Percent
Sodium arsenite-----	30	30	18	12
Do---------------	15	41	27	14
Ammonium bifluoride-	5	84	18	66
Do---------------	10	79	36	43
Do---------------	15	79	20	59

In October 25 trees from each dosage of each chemical applied were felled, debarked, and examined for bark-beetle attack. The results of these examinations are as follows.

Chemical	Dosage per inch	Trees		Total successful galleries[1]
		Examined	Attacked	
	Grams	Number	Number	Number
Sodium arsenite-------	15	25	0	0
Do-----------------	30	25	0	0
Ammonium bifluoride--	5	25	3	168
Do-----------------	10	25	2	23
Do-----------------	15	25	0	0
Checks---------------	(2)	3	3	6,971

[1] Scolytus multistriatus Marsham.

[2] The check trees were killed by a sodium chlorate injection which had previously been found to make the trees attractive to adults of S. multistriatus.

Notes on introduced ambrosia beetle breeding in elm wood.--According to C. H. Hoffman, Morristown, Xylosandrus germanus Bldfd. is an introduced oriental scolytid which has attracted some attention in connection with the Dutch elm disease. It has been collected in several localities in New Jersey and New York, also from Burlington, Ohio, and Huntington, W. Va. In New Jersey this ambrosia beetle has been bred from elm, oak, red maple, birch, and hickory. Adults have been observed to attack and usually breed in several types of host material, such as recently felled, dead, and fire-scarred trees, chemically treated trees and logs, and wind-broken branches, as well as freshly cut and old logs and stumps. The heaviest infestations seen in the field have been in elm branches partially submerged in water and in the roots of old elm stumps located in moist situations. Irregularly formed brood burrows are made in the wood, both with and against the grain, and fungus growth associated with the adults causes the wood at these points and for several inches longitudinally to become stained with a blue or black discoloration. Although both males and females are found in the galleries, the males never leave them. The females overwinter in groups in the burrows. In New Jersey they form brood burrows in May. These measure up to 14 mm. in length and each lobe of the burrow is lined with a white fungus growth, or ambrosia. The eggs are laid loosely in different parts of the burrow and the resulting larvae feed on the ambrosia. Several weeks are required for egg deposition, therefore it is not uncommon to find all stages of this insect in the galleris from June to September. Under insectary conditions the life cycle of *X. germanus* is completed in 4 or 5 weeks.

Notes on life cycle of hemlock.borer.--H. C. Secrest, Milwaukee, Wis., reports that life-history studies on caged hemlock borer material at the Menominee Indian Reservation show that the life cycle may be 1 or 2 years. Under favorable conditions larvae from eggs laid in June or early in July usually attain full growth in one season and hibernate in cells in the outer bark tissue. They pupate and the beetles emerge early the following summer, thus completing the life cycle in 1 year. On the other hand, under less favorable conditions the larvae may not complete development and move outward into the outer bark to pupate until early the next season; the adults emerge late in July and early in August. Larvae from eggs laid by these beetles overwinter as small larvae in their galleries in the inner phloem, attain full growth the next season, and hibernate in the bark, pupating and becoming adults the following spring. Thus larvae of all sizes may be found throughout the year.

Hemlock looper increasing in Wisconsin.--Mr. Secrest states that larvae of the hemlock looper were fairly abundant last summer on the Menominee Indian Reservation in Wisconsin, for the first time since 1926. The first moth was seen in the field on August 15, and the peak of the flight was during the first 2 weeks of September. The last moth observed in the field was seen on October 2.

Evidence of bark-beetle attacks hard to detect.--Donald De Leon, Fort Collins, Colo., reports that spotting of trees infested by the Black Hills beetle is much more difficult this fall than during the last few years. Most of the trees seem to be very heavily hit and very few, if any, visible pitch tubes are present. Consequently, the presence of boring dust around the base or in the bark crevices of infested trees is the only means of detecting them. Although the checking of every tree on the survey man's strip for the presence of boring dust has slowed up the survey crews' work this fall, the crews have already completed their work on most of the forests. The absence of many visible pitch tubes is probably due both to the drought of the past season and to the heavy attacks.

Low winter-temperature field study.--J. M. Whiteside, Portland, Oreg., states that the effect of low winter temperatures on the overwintering broods of the western pine beetle (Dendroctonus breviconis Lec.) is again being investigated by the Portland laboratory. Minimum air temperatures under actual forest conditions will be recorded during the next 2 or 3 winters on 70 regional pine-beetle survey plots selected at random throughout the ponderosa pine forests of eastern Washington and Oregon. In a general way temperature differences by life zones and infestation intensities will be sampled during this study. The trend and duration of the cold spells during the winter will be obtained from nearby standard Weather Bureau stations.

Bark-beetle survey completed.--F. P. Keen, Portland, reports that a cooperative bark-beetle survey of the ponderosa pine forests of eastern Oregon and Washington was brought to a close at the end of October. Extensive scouting work covered 11,000,000 acres of commercially valuable pine, while within this area 228 check plots totaling 88,950 acres were intensively cruised by 4 3-man survey crews. The survey showed declining infestation in eastern Washington and markedly increasing infestation in central and southern Oregon. As a result of the survey, beetle-control operations have been started on the Deschutes and Fremont National Forests, on the Warm Springs Indian Reservation, and on private lands in Oregon.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Falling of foliage provides excellent scouting conditions.--By the middle of the month several killing frosts had occurred and practically all deciduous trees, except the oaks, had dropped their foliage, and gypsy moth scouting conditions became excellent throughout the area. Although the fire hazards in woodlands were somewhat reduced, no burning was attempted at that time.

New egg clusters are larger than usual.--New gypsy moth egg clusters found in lightly infested territory since scouting was resumed this fiscal year are conspicuous because of their size. This appears to be true in the Pennsylvania area as well as in New England and in New York. It has been noticed, particularly in Massachusetts and Connecticut, that a large percentage of the new egg clusters are broken. This is a condition more commonly observed after winter has set in, when egg clusters are disturbed by the pecking of birds, by squirrels running over them, by ice and sleet tearing them from the tree trunks, or broken by other undetermined agencies. The breaking of the egg clusters reduces the effectiveness of treatment by creosote, as it is impossible to locate eggs scattered over the ground and from which caterpillars may emerge.

Forested areas in barrier zone steadily increasing in size.--From 10 to 15 years ago, maps were prepared by this Bureau of all townships included in the barrier zone. These maps outlined the woodland areas as they existed at that time, and they were an important aid in planning and performing gypsy moth work. Changes have since taken place as forest reproduction encroached on cleared land, changing the outline of the woodland sections and materially increasing their size.

Extreme care necessary by men doing gypsy moth ground work.--The need of exercising extreme care in examining all kinds of litter when doing gypsy moth ground work was recently demonstrated when an employee engaged in such work at one of the infestations in Connecticut picked up an old fence rail and discovered a hidden hickory nut on which a gypsy moth egg cluster had been deposited. Egg clusters are sometimes found in mail boxes, under stones, and in many other odd locations.

Gypsy moth colony found near assembling cage which attracted male moth.--Scouting in the vicinity of one of the assembling cages where male gypsy moths were taken last summer in Brandon, Vt., disclosed the presence of a small infestation. Brandon is the most northern town in Rutland County and is just within the border of the barrier zone.

Wind spread responsible for infestations in Vermont barrier zone area.--The numerous and widely scattered gypsy moth infestations which have been located in several townships in eastern Addison County, Vt., since the resumption of scouting work this season, indicate conclusively that dispersion of small caterpillars by the wind is responsible for their presence in some unusual and remote places. As wind spread from large or strategically located infestations east of the barrier zone is one of the most important factors contributing to the annual reinfestation of the barrier zone, it is necessary to do considerable gypsy moth work east of the zone in order to provide as much protection as possible to the zone itself.

Work pushed in mountainous sections of Vermont and Massachusetts.--Gypsy moth scouts working in Warren Town, Washington County, Vt., and in the adjoining town of Granville, Addison County, made satisfactory progress during October. The towns are situated in the heart of the Green Mountains and are exceptionally rugged in contour, heavily forested, sparsely settled, and penetrated by few roads. The men scouted over ledgy and precipitous slopes where foot travel is very hazardous, even under the most favorable conditions. Every effort is being made to complete work in such localities before winter. In addition to scouting, ground work was started at a recently located infestation in Warren. It is also planned to reexamine the sites of several small infestations in Granville before snow interferes with this type of work, in order to discover any hidden egg clusters that may exist. For similar reasons, gypsy moth employees in Massachusetts were detailed to ground work at recently located infestations, particular attention first being given to infestations situated on high and exposed elevations. Windfalls and small deadwood are cut up and piled for later disposal by burning, and standing dead and defective trees are cut down so that future inspections can be made more easily. It is especially important that trash wood on the ground be gathered and piled at once, as early snows and freezing weather will interfere with this type of work later in the season.

Sawdust mill valuable in dry woodlands.--The sawdust mill developed by this activity for converting brush and waste wood into sawdust has been in continuous operation in the western section of Franklin County, Mass. Large amounts of combustible material had accumulated at sites of gypsy moth infestations where chopping crews were engaged in cleaning up dead and defective trees and in selective-thinning operations, and where for some time the tinder-dry conditions in the woodlands had prevented disposal of the debris by burning.

Hurricane-felled timber difficult to examine.--Although damage by the hurricane of September 1938 was comparatively light west of the Connecticut River in Massachusetts, one of the gypsy moth crews scouting in Cummington, Hampshire County, encountered an extensive tract of down timber. Many of the uprooted trees were still alive and their dense foliage, together with the tangled mass of blow-downs, presented almost impenetrable thickets of tree tops, branches, and roots. The progress of the work in that region was considerably retarded, as such areas must be carefully inspected in order to discover all egg clusters and so prevent the wind spread of caterpillars into the barrier zone next summer. Cummington is located immediately outside of the barrier zone, and the mountainous character of the country presents ideal conditions for future wind spread into the barrier zone if the gypsy moth colonies are not exterminated.

Mountain-laurel thickets difficult to traverse.--A gypsy moth crew scouting in Woodbury, Conn., where a small gypsy moth colony was recently discovered, have been working in a tract of wild land densely overgrown with mountain-laurel. This shrub often grows in extremely compact thickets, very difficult to traverse, so that the progress of even the most experienced workers is greatly impeded. Woodbury is one of the southernmost towns in Litchfield County, and is within the borders of the barrier zone.

Small infestations found in the New York section of the barrier zone.--Scattered gypsy moth egg clusters were found by New York State forces in the eastern half of Berlin Town, Rensselaer County, N. Y., which is located immediately west of the Massachusetts State line. This necessitated some revision in the plans of work in several Massachusetts townships lying just to the east in Berkshire County. Gypsy moth infestations have seldom been found in these towns since the establishment of the barrier zone in 1924; but the fact that infestations, although they are small, were found to the west of the State line makes it imperative that the Massachusetts towns be carefully examined.

Scouting of Lackawanna and Susquehanna River banks completed.--The examination of the Lackawanna and Susquehanna River banks to high-water mark in parts of Lackawanna and Luzerne Counties, Pa., was completed during the last week in October. Only one gypsy moth infestation, located in Pittston Township, Luzerne County, was discovered during the progress of this important work.

Preliminary examinations of assembling cage sites.--In order to obtain preliminary information relative to the likelihood of infestation in the vicinity of assembling cages at which male gypsy moths were recovered during the past season in Pennsylvania, small crews of agents were detailed to make the initial surveys prior to the assignment of less experienced W. P. A. crews to scouting the areas. Negative results were obtained from the preliminary examinations in Kingston, Luzerne County; Penn Forest, Carbon County; and Tobyhanna, Monroe County. Infestations were located during this survey in the vicinity of cages which had attracted moths in Coolbaugh, Monroe County, and in Kidder, Carbon County, but most of these infestations are small and present no serious extermination problem.

Additional agencies contribute to gypsy moth work in Pennsylvania.--Elimination work against the gypsy moth, which has been conducted for several years by cooperation between the Federal Bureau of Entomology and Plant Quarantine and the Pennsylvania Bureau of Plant Industry, is now being supplemented by work from two other agencies. A State-sponsored gypsy moth project recently started in Pennsylvania is obtaining workers through the State Department of Public Assistance, but considerable difficulty has thus far been experienced in supplying the full quota of men. On October 16, 50 men started operations on a gypsy moth project sponsored by the National Youth Administration in the townships of Plains, Jenkins, and Pittston, in Luzerne County. The work was well under way by the end of October, and most of the young men appeared to be taking much interest in the work and were evincing a desire to learn as much as possible. It is expected that similar work by the National Youth Administration will be started soon in Lackawanna County.

Gypsy moth truck damaged by deer.--A pick-up truck used in gypsy moth work was damaged in Pennsylvania when a buck deer suddenly leaped from a dense thicket at the side of a narrow road directly onto the hood of the truck. The impact dented one of the truck doors and broke the windshield. The driver did not lose control of the machine and no injury to the driver nor serious damage to the truck occurred. The deer was instantly killed in the accident.

C. C. C. gypsy moth work during October.--Gypsy moth work by the Civilian Conservation Corps was greatly reduced during the first part of October, only 468 6-hour man-days being used during the first week. This was increased to 924 6-hour man-days during the last week of the month. The decrease in work was caused by a major reduction in the number of men available for gypsy moth work, as an enrollment period ended the last of September. Considerable time was lost during the first part of the month, owing to the necessity of training the new men both in fire fighting and in the different types of gypsy moth control work in the field. A total of 2,765 6-hour man-days was used on gypsy moth work supervised by this Bureau east of the barrier zone during October, while 7,247 6-hour man-days were taken from gypsy moth work and used to reduce forest-fire hazards. From July 1 to the end of October, C. C. C. men scouted 3,597 acres of woodland, did selective-thinning work on 619 of those acres, and treated 29,876 new gypsy moth egg clusters.

Heavy infestations east of the barrier zone show reduction of gypsy moth population.--An examination of the Granby-Simsbury-Canton area in Connecticut, where C. C. C. gypsy moth work was concentrated last winter, followed by spraying in the spring, showed that excellent results had been obtained and that very few new egg clusters were present in the treated area. Limited examinations of woodland areas east of the barrier zone in Connecticut and Massachusetts indicate some reduction in gypsy moth egg deposition in towns where severe infestation has existed during the last few years. This was also true in an area examined in one town in the Connecticut River Valley in Vermont. However, there is scattered general infestation of large healthy egg clusters in these areas, and a great deal of work is necessary to prevent heavier infestations developing.

PLANT DISEASE CONTROL

Local outbreaks of stem rust in Minnesota.--Crop and weather conditions in Minnesota this year favored local epidemics of stem rust. During the season 25 cases of stem rust outbreaks near barberry bushes were observed and mapped. The following table indicates the host plants found rusted near infected barberry bushes.

Host	Spreads	Variety of stem rust
	Number	
Wheat	2	Puccinia graminis tritici
Oats	3	Puccinia graminis avenae
Barley	7	Puccinia graminis secalis or tritici
Rye	8	Puccinia graminis secalis
Timothy (Phleum pratense)	3	Puccinia graminis phlei pratensis
Quackgrass (Agropyron repens)	10	Puccinia graminis secalis
Wild barley (Hordeum jubatum)	5	Puccinia graminis secalis or tritici
Redtop (Agrostis alba)	3	Puccinia graminis agrostidis
Western wheatgrass (Agropyron smithii)	1	Puccinia graminis secalis or tritici

Stem rust on rye in Sherburne County was traced for 2½ miles from the barberry bushes that yielded the initial inoculum. Several sections were involved and a study of the area indicated that barberry bushes distributed throughout the county were responsible for local epidemics that eventually coalesced, causing general infection. The only ryefields infected with stem rust in Minnesota this year were found to be located near barberry bushes. In the early days of the barberry-eradication campaign, when barberry bushes were numerous and widespread, fields of rye were commonly damaged by stem rust. Since large numbers of barberries have been eradicated in Minnesota, heavily rusted fields of rye have been rare and have been found only in the vicinity of barberry bushes. The most heavily rusted field of wheat found in Minnesota this year was near Chaska, in Carver County. Infected barberry bushes were found on all 4 sides of it. This particular field was used by D. G. Fletcher, executive secretary of the Rust Prevention Association, as a demonstration of what happens when barberry bushes are permitted to grow near grainfields. The demonstration, held on July 6, was attended by about 25 prominent farmers and business men, some of whom were from the grain trade in Minneapolis.

Ten million barberry bushes destroyed in West Virginia since May.-- The following table indicates the progress that has been made in barberry eradication in West Virginia during the period May to October 1939.

County	Labor		Area surveyed	Properties cleared	Bushes destroyed	Salt used
	Maximum workers	Man-days				
	Number	Number	Square miles	Number	Number	Tons
Berkeley[1]	11	373	60.02	1	35	0.01
Greenbrier	75	4,037	18.14	14	885,426	25.80
Jefferson[1]	11	510	122.11	1	70	.04
Monroe	88	4,133	5.88	42	6,718,074	256.18
Pocahontas[1]	13	610	10.04	2	33	.24
Summers	24	144	1.80	16	2,283,842	64.87
Total	222	9,807	217.99	76	9,887,480	347.14

[1] Berberis vulgaris destroyed.

Since August 1935 some control work has been conducted in 10 different counties. Five of the southeastern counties situated in the foothills of the Allegheny Mountains comprise the major portion of the Berberis canadensis area. Farther north very little B. canadensis is found and the control problem is largely one of eliminating the common barberry (B. vulgaris), which has spread from ornamental plantings made some years ago.

Reinspection of known areas of infestation in Illinois.--According to R. W. Bills, in charge of barberry eradication in Illinois, areas infested with barberry bushes in Jo Daviess, Stephenson, La Salle, McHenry, Lake, and Du Page Counties, where initial control work was conducted in 1933, 1934, and 1935, have been reinspected this fall preliminary to carrying on clean-up work next year. In northern Illinois, reinspections are required at 5- to 6-year intervals in order to prevent seedling bushes from reaching the fruit-bearing stage. Clean-up work of a similar nature is now in progress in Rock Island and Marshall Counties. The general plan in Illinois is to keep a part of the field force on clean-up work in known areas of infestation while the remainder continues a survey of central and southern counties where bushes are far less numerous but where no complete survey has yet been made.

Blister rust field conference.--Twenty-five members of the Bureau and Forest Service technical staff in the western white pine region met on October 3, at Pierce, Idaho, to observe and discuss on the ground various blister rust control problems and practices. Beside those regularly engaged in control work, the group included Elers Koch, chief of timber management for region 1, and Ray Coster, supervisor, and Fred Neitzling, assistant supervisor of the Clearwater National Forest. The conference started with a half day of actual Ribes-eradication work to study production and efficiency on crew strips of various widths. In the 4 days' session consideration was given to practical modifications of Ribes-eradication methods, eradication tools, and checking methods. Plots established to study disease behavior on worked areas and the influences of sheep grazing on Ribes and pine regeneration and growth were inspected and discussed. A particularly interesting study of certain sheeping problems, which is being conducted jointly by the Clearwater Timber Protective Association and the University of Idaho on cut-over land, includes tight enclosures in which controlled grazing is performed. Through this study it will be possible to obtain data on the amount of damage to white pine seedlings from trampling, the browse value of common woods plants, and regeneration and growth of Ribes on sheeped areas.

Patent for "Herbicide" issued to H. R. Offord.--U. S. Letters Patent No. 2,173,236, dated September 19, 1939, and entitled "Herbicide," was issued to Harold R. Offord, in charge of the development of blister rust control methods, with headquarters at Berkeley, Calif., for "the free use of the people of the United States." Mr. Offord's invention relates to a new herbicidal formula for killing all manner of plants growing in promenades, alleys, public places, landing fields, along roads and railways, in forested areas, and specifically for the killing of currants, gooseberries, and barberry plants, where they occur in wild or cultivated state. The herbicide is composed of ammonium thiocyanate, furfural, and diesel oil, and is specifically designed for the eradication of plants

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growing in soils that contain too high a percentage of moisture to allow rapid penetration and maximum absorption of diesel oil by the soil.

Improved Ribes-eradication tools increase efficiency in control work.--The development of Ribes-eradication tools in the Northwestern region has made a significant advance in the efficiency of control work. The improved tool used this season has worked out very satisfactorily. The Coeur d'Alene operation is experimenting with a Ribes hook which seems to be very satisfactory on rework areas where heavy pulling is not a factor. It is believed that the progress being made in connection with the improvement of Ribes tools will serve practically to eliminate the problem of broken-off crowns. Once this problem is overcome the amount of rework in subsequent years should be considerably reduced.

Many newly infected counties reported.--This fall a considerable number of newly infected counties have been reported in the Southern Appalachian and North Central regions. In the Southern Appalachian region, blister rust on Ribes was reported for the first time in Prince Georges County, Md., on Ribes americanum; in Kent County, Del., on cultivated red currants; in Preston County, W. Va., on R. rotundifolium; and in Albemarle County, Va., on R. rotundifolium. In Greene County, Va., rust was reported for the first time on white pine. Four pines were found to be infected with a total of 19 cankers. In the North Central region, blister rust on Ribes was found for the first time in Allamakee, Floyd, Howard, Mitchell, Tama, Worth, Delaware, Dickinson, and O'Brien Counties, Iowa, the infected host plant in all cases being R. nigrum. In Wisconsin infection was found for the first time on Ribes in Jefferson and Lafayette Counties. Both of these infections, which were on R. nigrum bushes, were extremely light, due perhaps to the very dry summer. Blister rust on Ribes now has been found in every county in Wisconsin. In Ohio, blister rust was reported for the first time on Ribes in Coshocton and Union Counties on R. americanum, in Erie and Huron Counties on R. cynosbati, and in Ottawa, Marion, Hardin, Logan, Van Wert, Champaign, and Richland Counties on R. nigrum. These new discoveries extend the known range of infection about 50 miles farther south in western Ohio. In the sugar pine region, W. V. Benedict reports that all scouting activities terminated the middle of October and no advance in the southward spread of the rust was found this season. Scouting results bore out preseason observations that weather conditions this year were not satisfactory for the long-distance spread of the rust.

New blister rust exhibit attracts attention at Eastern States Exposition.--The new blister rust exhibit, recently constructed by the Office of Exhibits of the Department, was displayed at the Eastern States Exposition this fall and attracted a great deal of attention. It is a three-wing panel type, made of knotty white pine with imitation white pine logs at the end of the wings. The central feature is a diorama showing a bulldozer in action, a crew uprooting Ribes, and scouts examining a diseased tree and Ribes. On the left of the diorama is a transparency showing the uredo and telial stages of the rust on Ribes leaves and on the right is a typical blister rust canker on white pine showing the aecial stage of the disease. One of the wings has a map showing the range of the white pines and blister rust and the other, a brief statement about the disease and its control. The total attendance at the exposition was about 284,000, and it is estimated that 75 percent of these people visited the Industrial Arts Building housing the Government exhibits. As nearly as could be determined, more than half of these persons saw the blister rust exhibit. Keen interest was shown by the public and the attendant at the exhibit was busy from 10 a.m. until 10 at night.

COTTON INSECT INVESTIGATIONS

Relation of other hosts to aphids on cotton.--E. W. Dunnam and J. C. Clark, Stoneville, Miss., have been giving attention to the species of aphids found on cotton, the relation of other host plants to the species found on cotton, and parasitization of aphids. In an effort to determine whether the more general use of winter cover crops in the Mississippi Delta during recent years has a bearing on the infestations on cotton, collections of aphids were made during the spring of 1939 on the principal cover-crop plants used in this locality. On April 3, aphids were collected from hairy vetch, Austrian peas, and bur clover. All aphids collected on the three crops were determined as the pea aphid. Aphids were collected on May 12 from cotton seedlings in the 2-leaf stage located within 100 yards of the cover crops and within 200 yards of a peach orchard. All were found to be the cowpea aphid. An average of 7 aphids was found per 100 plants examined and none was parasitized. A collection made from this cotton on May 19, when it was in the 4-leaf stage, was a mixture of *Aphis medicaginis* Koch and the green peach aphid. An average of 38 aphids was found per 100 plants examined and 0.04 percent was parasitized. In another collection made on May 26 in this same cotton, when it was in the 5-leaf stage, there were present *A. medicaginis*, *Myzus persicae* Sulz. and the cotton aphid. A single winged from of *Macrosiphum* (*Illinoia*) *pisi* was also taken, but it is not certain that this species was feeding on the cotton. An average of 9 aphids was found on each 100 plants examined and none was parasitized. A collection made September 11, when the population was causing defoliation, were all determined as *A. gossypii*. A collection was made on May 10 on cotton planted early in another field located near a thickly wooded area more than half a mile from a peach orchard or any cover crops. The plants were in the 3-leaf stage and, when pains were taken to collect heavily infested plants, an average of 12 *M. persicae* per plant was found. No other species of aphids were collected in this field at the time. More than 14 percent were parasitized by the braconid *Lysiphlebus testiceipes* (Cress.). On May 23 a second collection was made in this field and an average of 14 aphids per plant was found, which were determined as *A. gossypii*. More than 45 percent of these aphids were parasitized by *Lysiphlebus*. A collection was made on June 20, when the plants were in the 4-leaf stage, in a third cottonfield planted June 2, or from 1 to 2 months later than normal. The 2 species collected were determined as *M. persicae* and the potato aphid. There was an average of 5 aphids per 100 plants and none were parasitized. In another collection made on June 22 from this field, all were determined as *A. gossypii*. It is thus seen that in the first field *A. medicaginis* was collected on May 12, 19, and 26; *M. persicae*, May 19 and 26; and *A. gossypii*, May 26 and September 11. In the second field *M. persicae* was collected on May 10 and *A. gossypii* on May 23. In the third field *M. persicae* was collected on June 20, *Macrosiphum* (*Illinoia*) *solanifolii* on June 20, and *A. gossypii* on June 22. These and other collections made later in the season indicate that several species of aphids migrate from other host plants and become abundant on cotton seedlings early in the season but eventually disappear and by the middle of the season we have an almost pure, if not entirely pure, population of *A. gossypii* on cotton in the Delta section. The pea aphid, which was the only species collected on the cover crops, was not a factor in the early season infestations, only a single alate form being taken on cotton. P. W. Mason determined the aphids and C. F. W. Muesebeck the parasites.

Effect of calcium arsenate on aphid predators and parasites.--Observations made by C. F. Rainwater and F. F. Bibby at Florence, S. C., in cottonfields dusted with calcium arsenate for boll weevil control, showed a noticeable decrease in predacious coccinellids in the dusted plots. At the same time hundreds of *Chrysopa* eggs were observed but no larvae were seen. No reduction in the number of parasitized aphids was noted; on the contrary, they were more abundant as the aphid population increased. Two cage tests were conducted to obtain more definite information on the effect of calcium arsenate on the ladybeetles. A screen-wire cage was placed over each of two aphid-infested cotton plants, one of which had been dusted with calcium arsenate and the other untreated. Seventy adult Coccinellidae, mostly *Hippodamia convergens* Guer. but with a few *Cycloneda sanguinea* L. and *Coleomegilla fuscilabris* (Muls.), were released in each cage on August 7. Daily examinations were made on the number of dead beetles until August 22. Another similar test was begun on August 23 with 60 and 55 beetles, respectively, placed on the treated and untreated plants. In this test examinations were made only until August 26. The results of these 2 tests follow.

Test No.	Live coccinellids released		Total coccinellids found dead		Coccinellids found alive at end of test	
	Dusted	Check	Dusted	Check	Dusted	Check
	Number	Number	Number	Number	Number	Number
1-----------	70	70	55	9	0	23
2-----------	60	55	29	3	28	43
Total----	130	125	84	12	28	66

It will be observed that the mortality of the beetles in the dusted cage in test 1 was much greater than in test 2. This may be due to several intermittent showers during the period of the second test, the first occurring within a few hours after the beetles were released, and to the shorter time examinations were made. However, these tests show that calcium arsenate dusted on cotton plants does kill the predacious coccinellids feeding on aphids and is apparently a factor in the increase in aphid infestation that frequently occurs following dusting with arsenicals.

PINK BOLLWORM AND THURBERIA WEEVIL CONTROL

Gin-trash inspection.--Gin-trash inspection is begun each crop season with the harvesting of the cotton crop to determine the degree of infestation in regulated areas and to locate possible infestations in nonregulated areas. Inspections of gin trash in Alabama, Georgia, Mississippi, Florida, and Louisiana were negative for the 1939 season. The pink bollworm was found for the first time in Mitchell County, Tex., in October 1939, when one specimen was taken in the examination of a large quantity of gin trash in that county. Additional pink bollworm specimens were found in gin trash in Concho and Tom Green Counties in October, following the initial finding of pink bollworms in those counties in September. Inspection of gin trash in the regulated areas in October resulted in negative findings in Arizona. The Pecos Valley of New Mexico, which has been infested for many years, was found to have in general a lighter infestation in 1939 than during the previous year, although a heavy localized infestation was found in one field in Eddy County, N. Mex.

Field clean-up in south Texas and the lower Rio Grande Valley of Mexico.--Field clean-up was brought into practice for the first time in the lower Rio Grande Valley of Texas in the 1937 cotton crop, following the finding of pink bollworm infestation in the 1936 cotton crop, in Cameron and Starr Counties and in the Matamoros area in adjacent Mexico, and has been carried out each following year in south Texas counties as one of the principal control measures in the fight to eradicate the pink bollworm from that region. Field clean-up in this area, as practiced by the farmers under State regulations, had not proved adequate as a suppressive measure; consequently, in order to increase the efficiency of the clean-up program, and to bring some financial relief to the local growers, funds were appropriated by Congress so that the Federal Government bore in part the cost of clean-up during the 1939 season. This resulted in a more thorough and satisfactory clean-up than had been obtained heretofore. Cooperation on the part of the farmers in this area during the 1939 clean-up continued entirely satisfactory in the main; however, the payments made by the Department did not cover the entire cost of the clean-up, and in some instances growers failed to destroy the cotton stalks and were not in line for payment. As a matter of fact, some cotton stalks were still standing on October 1, at which time it became mandatory under State regulations to have the fields free of growing cotton. The State filed charges against several persons in this connection. The appropriation of funds for clean-up in south Texas made it possible for the Department to undertake the elimination of all soca or abandoned cotton in the lower Rio Grande Valley. It is believed this will result in the removal of one of the means by which the pink bollworm has been carrying over in considerable numbers. Essentially the same program was undertaken in the Coastal Bend counties as that in the valley. Owing to a slight difference in the maturity of the crop and the growing season, the State requires that all growing cotton be removed from fields in that area by October 15. There were very few aggravated cases of noncompliance with respect to the State order on that date, and no charges were filed against growers in that region. Soca or abandoned cotton does not offer any considerable problem in the Coastal Bend. In addition to the work performed on the American side, there was a very active stalk-destruction program in the lower Rio Grande Valley of Mexico. The Bureau cooperates with the Mexican Department of Agriculture in the assignment of inspectors with cars to work with inspectors of the Mexican department. Regulations requiring the destruction of plants by the owners at their own expense are in effect on the Mexican side.

Okra infestation in the lower Rio Grande Valley.--One of the principal activities in the lower Rio Grande Valley district during October was in connection with okra, following the amendment of the pink bollworm quarantine in September to add okra to the list of articles requiring certification for movement outside regulated areas. This action was taken as a result of the discovery of light pink bollworm infestation in okra pods in August. During October, 26 additional okra fields were found to be infested, making a total of 34 infested fields at the close of October 31. Since the beginning of okra inspections in September, approximately 91 okra plantings have either been destroyed by plowing and burning the stalks and pods or have been cut back so as to retard the fruiting period. Most of these plantings, having no commercial value, were completely destroyed. Of the 91 plantings plowed out, 57 were not known to be infested; they were, however, contiguous to infested fields (either okra or cotton) and the owners voluntarily destroyed them without inspections being made. Effective October 28, State Quarantine Proclamations 67-J, amended, and 67-L were released by the Commissioner of Agriculture. These proclamations permit shipments from fields under certain safeguards outlined therein. Growers have expressed their willingness to cooperate in every respect with the authorities in controlling the pink bollworm menace. Dealer-carrier permits for the movement of okra were put into effect in October.

Field clean-up in the Big Bend.--In October a decision was reached by agricultural officials of both the United States and Mexico to again institute control measures for the 1939-40 crop season in the Big Bend area of Texas and Mexico, similar to the program brought to a close with the maturity of the 1939 cotton crop. This decision was made following the very successful outcome of the 2-year cooperative plan for the 1938-39 season in the Presidio-Ojinaga section, which was carried on in an effort to suppress the very heavy pink bollworm infestation in that region. Such action was believed expedient in order to hold the remarkable advantage gained over this insect, and perhaps bring about even a greater reduction of infestation for the 1940 crop season. Field clean-up in the Big Bend area of Texas is being carried on with Federal funds this season, as was the case under the 2-year plan. However, farmers are cooperating to the best of their ability in getting their cotton picked out early in order that fields may be available for cleaning. Stalk-destruction work in the Presidio area was begun the first part of the last week in October, and at the end of the month approximately 400 acres of stalks had been cut. Some of the most important acreage, with reference to infestation, was cut during this period and prior to the heavy frost which occurred on October 31. This accomplishment was of great advantage to the program, inasmuch as considerable shattering of material occurs during stalk-cutting operations after frost. Field clean-up in Ojinaga, Mexico, was also getting under way at the end of the period.

Wild-cotton eradication in southern Florida.--An effort was begun a number of years ago to eradicate wild cotton from southern Florida, following the discovery that this plant was heavily infested with the pink bollworm. Wild cotton in this area bears fruit throughout the year, and thus serves as a continuous host to the pink bollworm, from which this menace was spreading to domestic cotton plantings in the Southeastern States. On October 1, 36 W. P. A. employees and 1 Bureau inspector were engaged in this work on Key Largo and the Matecumbes. During the first week of the month crews were started at Key West, Bonita Springs, Fort Myers, Punta Gorda, Bradenton, Tampa, and St. Petersburg. By the end of the period there were 11 crews in the field employing a total of 82 laborers and 9 foremen. In addition to the known wild cotton acreage, 1,569 acres was scouted for plants, with negative results. Efforts in regard to the establishment of a C. C. C. camp at Cape Sable, to aid in wild-cotton-eradication work, were continued during October. The erection of this camp has been interfered with to a considerable extent by unfavorable weather.

Thurberia-plant eradication.--The eradication of Thurberia plants was continued throughout the Tortillita Mountains of southern Arizona during October. An effort has been under way since 1935 to destroy these plants from areas adjacent to domestic cotton plantings, because they are infested with a weevil which is destructive to cultivated cotton, and to which it was spreading from infested mountain ranges. This work made good progress during October. A total of 8,800 acres was covered and many Thurberia plants were destroyed. Practically all fruiting plants showed Thurberia weevil infestation.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Suspected plant bugs not responsible for "pinworm" injury to tomatoes.--Special studies were performed in the Charleston, S. C., area by C. O. Bare, during which a series of adults of the southern green stinkbug, the leaf-footed bug, the tarnished plant bug, an undetermined species of a leaf-footed bug, an undetermined plant bug, and larvae of the tomato fruitworm (*Heliothis armigera* (Hbn.)) were confined in cages with tomato plants and observations were made on the resulting damage to the fruits by each of the species involved. It was indicated that the so-called "pinworm" type of injury to tomato fruits of which the growers complain frequently was not caused by any of the species of plant bugs included in these tests. The injury is possibly caused by small larvae of *H. armigera* or by other lepidopterous larvae.

Methods for reducing tobacco moth in growers' pack houses.--Experiments in North Carolina by J. P. Vinzant and H. N. Pollard, of the Richmond, Va., laboratory, against *Ephestia elutella* (Hbn.) in growers' pack houses indicated that the covering of tobacco "bulks" with tobacco cloth during the period when the adults of *E. elutella* were in flight, supplemented by weekly applications of pyrethrum powder directed against the adults, served to reduce greatly the infestation in the stored tobacco. In the course of these experiments certain of the tobacco bulks were covered with plant-bed cloth in each of 6 pack houses. The cloth served as an egg trap upon which the moths laid their eggs. This cloth was removed at frequent intervals during July, August, and September and immersed in boiling water for the purpose of killing the tobacco moth eggs deposited thereon. Three of the pack houses were dusted each week with pyrethrum powder, at a dosage of approximately 3 ounces per 1,000 cubic feet of space. An examination of the stored tobacco in covered and uncovered bulks at the time of the grading for market disclosed a pronounced reduction in the number of tobacco moth larvae and injured leaves in the covered, as compared to the uncovered, bulks. A detailed examination of 30 sample sticks (a stick consists of about 60 to 90 leaves of tobacco) from the uncovered bulk in 1 pack house revealed an average of 63.0 larvae per stick, as compared with 1.7 larvae per stick in the covered bulk, comprising a reduction of 97.3 percent. There was also a reduction of 82.5 percent in the number of injured leaves in the covered bulk, as compared to the uncovered. Similar examinations in 2 other pack houses disclosed reductions of 73.1 and 88.7 percent, respectively, in the covered bulks, as contrasted to the unprotected tobacco.

Sulfonation of certain vegetable oils reduces injurious effects on plants.--In tests designed to determine the foliage tolerance of squash, melon, cucumbers, cabbage, collards, and kale, to cube sprays, each containing one of three natural vegetable oils, or of three sulfonated vegetable oils,

R. A. Fulton, of the Columbus, Ohio, laboratory, determined that no foliage injury occurred on melons, cucumbers, or four varieties of squash when sprays containing the natural or sulfonated vegetable oils were applied. On cabbage, collard, and kale the natural oils (with the exception of grapefruit-seed oil) destroyed most of the typical sheen of the leaves and caused the plants to assume a yellow-green appearance. The sulfonated oils of peanut, soybean, and grapefruit seed affected the sheen to a lesser degree. Sulfonated grapefruit-seed oil on cabbage and collard removed only an estimated 10 and 5 percent, respectively, of the natural sheen, whereas a slight yellowing was produced on kale by the application of sprays containing this oil. In general, it was found that the sulfonation of the oils of soybean, peanut, and grapefruit seed caused less injury on cruciferous plants than did the natural oils, but all of them affected the natural blue sheen. The sulfonated grapefruit-seed oil caused less injury than did soybean or peanut oil. No injury occurred to any of the cucurbits involved in the experiment when treated with a spray containing 1 percent of oil in water and cube containing 0.02 percent of rotenone. Incidentally, it was observed that the physical properties of sulfonated soybean and peanut oils were such as to enhance the suspension of cube particles in the spray, as compared to sprays not containing these oils.

Important results obtained in insecticide tests against raspberry fruitworm.--In summarizing the results of insecticide tests against *Byturus unicolor* Say during 1939, B. J. Landis, W. W. Baker, and associates at the Puyallup, Wash., laboratory, report that examinations of samples of loganberries harvested from plots dusted with a cube dust mixture on Vashon Island showed (1) that a dust mixture containing 0.50 percent of rotenone was superior to a dust mixture containing 0.25 percent of rotenone; (2) that the addition of a wetter and spreader to the dust mixture slightly improved the degree of control attained; (3) that there appeared to be little difference in the ultimate control achieved between plots treated with a dust mixture on the basis of a 7-12-12 and a 12-12-12 day schedule, respectively, beginning with the appearance of the first blooms; (4) that the cleanest berries were harvested during the third and fourth weeks of picking; and (5) that applications of rotenone-dust mixtures, which gave good control in the Puyallup district during 1937 and 1938, did not give satisfactory results in fields treated for the first time if the *B. unicolor* population was at a high level. Examination of samples of raspberries demonstrated that very good control was obtained following three applications of a dust mixture containing 0.5 percent of rotenone or a spray containing 0.01 percent of rotenone, with or without a wetter and spreader, when such dust mixtures or sprays were applied according to a 7-10-10 or a 10-10-10 day schedule, respectively, beginning with the appearance of the first blooms. Examination of samples of various berries located in 14 fields treated or untreated by growers in accordance with commercial practice showed (1) that 2 applications of a dust mixture containing 0.5 percent of rotenone gave good control when applied at the proper time; (2) that 1 application of this dust mixture did not provide adequate protection from *B. unicolor* during the entire period of commercial picking; (3) that fields not treated with dust mixtures or sprays containing rotenone during 1939 were rather heavily infested by *B. unicolor*, even though this pest had been held in subjection during preceding years by applications of either of the designated insecticidal treatments.

Fall populations of beet leafhopper low in southwestern Idaho.--Surveys made by J. R. Douglass and his associates of the Twin Falls, Idaho, laboratory during the period July to September indicate that the low populations of the leafhopper during the spring, supplemented by unfavorable conditions of host plants during the summer, have resulted in the lowest fall population of the beet leafhopper recorded in the past 6 years in southwestern Idaho. The survey disclosed that there were approximately 425,000 acres of Russian-thistle (Salsola pestifer A. Nels.) in this area during 1939, as compared with an average of approximately 473,000 acres of this plant during the preceding 6 years. Premature drying of Russian-thistle actuated by dense stands which crowded this plant, or mixtures of Russian-thistle with downy chess or other spring annuals, together with deficient moisture, resulted in the decimation of the stand of this host plant.

Status of various insect pests determined on shade-grown and sun-grown tobacco.--In a survey of insect damage on shade-grown and sun-grown tobacco, performed by F. S. Chamberlin, A. H. Madden, and L. L. May of the Quincy, Fla., laboratory, it was found that in 15 fields of shade-grown cigar-wrapper tobacco in the Quincy area the percentage of damage caused by the tobacco hornworms (Protoparce quinquemaculata (Haw.) and P. sexta (Johan.)), the tobacco flea beetle (Epitrix parvula (F.)), and the tobacco budworm (Heliothis virescens (F.)) was 0.1, 0.5, and 0.1, respectively, on the basis of the local grading system for cigar-wrapper tobacco, which is based on the degree of soundness of the leaf surface. In a similar survey of fields of sun-grown tobacco of the cigar-filler and cigarette types it was found that the average damage sustained by the feeding of hornworms and the tobacco budworm was 1.6 and 1.0 percent, respectively, on the basis of loss in weight.

Shipments of European earwig parasites.--C. W. Getzendaner and R. S. Wright, of the Puyallup laboratory, report that during the past summer a total of 2,335 adults of Bigonicheta setipennis Fall., an imported parasite of the European earwig (Forficula auricularia L.), were shipped for colonization to Massachusetts, Rhode Island, Utah, and Washington, and that the mortality en route of these parasites averaged approximately 10.8 percent.

INSECTS AFFECTING MAN AND ANIMALS

Nicotine as a mosquito larvicide.--H. H. Stage, of the Portland, Oreg., laboratory, reports that in preliminary tests Blackleaf 155, applied either as a dust or as a nicotine-bentonite-soybean-oil emulsion, failed to produce better than an 80-percent kill in laboratory tests against larvae of Culex and Theobaldia when applied at the rate of 4 pounds of actual nicotine per acre. This amount of nicotine would require 84 pounds of nicotine dust per acre, as the Blackleaf 155 dust contains approximately 4.75 percent of nicotine. The cost of application at this rate would be prohibitive. In these tests it was noted that the nicotine seemed to have a paralyzing effect, as larvae that appeared dead later became active. Large larvae appeared to be killed more easily and quickly than were second- or third-instar larvae.

Comparative toxicity of larvicides to mosquito larvae.--Twelve different preparations representing seven different poisons were tested in the laboratory against third- and fourth-instar larvae of four different genera of mosquitoes. The poisons tested included diesel oil, cashew-nut oil, pyrethrum, phenothiazine, 1-phenol benothiazole, paris green dust, and nicotine-bentonite. Diesel oil and cashew-nut oil combinations appeared to be equally effective against all four genera and gave good kills. Phenothiazine preparations varied in their killing power. *Culex* and *Anopheles* appeared to be more susceptible to this poison than were *Aedes* or *Theobaldia*. The benothiazole at the strength used gave poor kills against the three genera tested. *Culex* showed the greatest resistance to floatable paris green dust and *Anopheles* were the easiest to kill. *Anopheles* showed a surprisingly strong resistance to pyrethrum. Nicotine gave poorest kills against *Theobaldia*. A general summary of all the poisons tested against the three genera of pest mosquitoes showed that the *Aedes* genera were the least resistant, the *Culex* next, and that *Theobaldia* were the most resistant. In an additional series of tests, in which the effect of pyrethrum on the larvae of *Culex* and *Anopheles* was further compared, it was found that an average of 96 percent of the *Culex* larvae were killed in 24 hours and only 60 percent of the *Anopheles* larvae. In 48 hours the average percentage of kill changed to 99 percent for *Culex* and 87 percent for *Anopheles*.

Phenothiazine as a larvicide in emulsified form.--Five grams of phenothiazine dissolved in 5 cc. of acetone and 20 cc. of penetrol is the formula commonly used in applying this poison as a mosquito larvicide. Field tests have shown that less than 3 gallons per acre would be needed to get a kill of 95 to 98 percent with this mixture. For hand application with a knapsack sprayer more volume is needed to get good coverage. From 15 to 25 gallons should be applied, depending on the amount of vegetation and debris. To provide this volume, phenothiazine emulsions were prepared using several different emulsifiers, including methyl ethyl ketone and soap, gylcerine and alcohol, didichloro ethyl ether and triethanolamine, methyl isobutyl ketone, methyl amyl ketone, and triethanolamine, acetone, pine oil and triethanolamine, methyl isobuty ketone, and Dupont's Avirol. Emulsions were also made from isobutyl ketone, diesel oil, and triethanolamine, also from methyl isobutyl ketone and triethanolamine. These emulsions were tested on *Culex* larvae and compared to checks treated with 0.5 part per million of King's formula (5 grams of phenothiazine in 5 cc. of acetone and 20 cc. of penetrol). These checks gave a mortality of 89 percent and the methyl amyl ketone emulsion gave 84 percent mortality. The rest of the emulsions ranged downward in effectiveness to as low as 20 percent kill with the dichloro ethyl ether preparation. The best of these emulsions have excellent physical properties, are stable, and can be diluted with water in any proportion. Since good kills can be obtained, the emulsified phenothiazine becomes a practical larvicide which will insure adequate coverage of the water surface.

Toxicity of mosquito larvicides to other aquatic animal life.--Various larvicides were tested on free-swimming organisms, as time permitted and material was available last season. Pyrethrum emulsion, diesel oil, cashew-nut oil and diesel-oil mixtures, paris green dust, nicotine emulsions, phenothiazine emulsions, and phenothiazine dissolved in acetone-penetrol mixtures were the larvicides used. Data were obtained on the effect of these larvicides on members of the classes Crustacea and Insecta and on the order Anura of the Class Amphibia. Two species of fish were also tested. Although the work was limited in scope and incomplete, the following conclusions can be drawn: In general, larvicides that are toxic to mosquito larvae will be toxic in nearly the same degree to most aquatic insects. Adults that spend most of their time on or near the surface of the water are very quickly killed by larvicides. Organisms that spend most of their time in the lower or bottom strata are not easily killed by surface larvicides. Dragonfly nymphs are more resistant to various larvicides than are damsel fly nymphs. Pyrethrum emulsions at both 25 and 35 gallons per acre were not toxic to amphibia or fish. Diesel oil applied at the rate of 25 gallons per acre was partially toxic. Liquid preparations containing cashew-nut oil were very toxic to nearly all aquatic life.

Experiments with poisoned baits for control of fire ants.--B. V. Travis reports that final observations for the present year were made in October on the experiments with poisoned baits for the control of fire ants at Forshala Plantation, Fla. The data have not been completely analyzed but it appears that thallium acetate was more effective against fire ants than was thallium sulfate. The results indicated that the bait was more effective when applied in a bait can, although satisfactory results were also obtained with the acetate baits in sawdust applications. Good results were obtained with the sulfate bait when applied in the spring, but not when used in the fall. The lower concentrations of thallium acetate baits were more effective when used in the spring, whereas the higher concentrations seemed to be slightly better in the fall. The most noticeable feature of the poisoned-bait tests is that there was no increase in the number of colonies in the area treated, such as has been noted in soil-fumigation experiments.

FOREIGN PARASITE INTRODUCTION

Beauvaria bassiana as a natural control for codling moth larvae.--In studying the natural control factors operating against the codling moth it was noticed that the mortality of first- and second-instar larvae appeared to be unusually high in orchards near Kearneysville, W. Va., in 1939. The season was unusually rainy. In the first-brood infestation counts made by E. Gould in the biological orchard there were 1.83 worm entrances to each sting. In 1938, a much drier season, the same trees showed 4.88 worm entrances to each sting. Six of 10 dead larvae removed from stung apples produced mycelial growth of a fungus, Beauvaria sp., probably bassiana. A small experiment was conducted by P. E. Marucci on July 3, in which spores of the fungus were sprayed and dusted on stung and clean apples on which 2 freshly laid codling moth eggs were placed. Each apple was placed in a jelly jar and left undisturbed until August 27. The results are given in the following table.

Treatment (20 apples)	Eggs hatched	Apples scored		Mature larvae in cocoons		Moths	Dead larvae		Larvae dead
		Stings	Worms	Dead	Alive		Before maturity	Showing white powdery growth	
	No.	No.	No.	No.	No.	No.	No.	No.	Percent
Wormy--sprayed--	--	--	20	2	2	5	11	7	65.0
Wormy--dusted---	--	--	20	3	1	2	14	5	85.0
Wormy--check----	--	--	20	-	8	13	--	-	--
Clean--sprayed--	29	29	3	1	1	1	26	5	93.1
Clean--dusted---	26	25	2	-	--	2	24	1	92.3
Clean--check----	27	31	19	-	13	2	12	-	44.4

The results of this small-scale experiment indicate that the fungus is capable of infesting larvae already established in an apple and that it prevents a large percentage of first-instar larvae from making successful entries into apples sprayed or dusted with the spores.

Predaceous thrips on codling moth eggs.--In studying the effect of artificial control practices on natural enemies of insect pests, H. A. Jaynes and P. E. Marucci report finding a large number of black thrips (Leptothrips mali (Fitch)) occurring in the two apple orchards under observation near Kearneysville, W. Va. This thrips has been reported as predaceous on other thrips, mites, and aphids. It was abundant in daisy flowers, as well as on the apple foliage. Both nymphs and adults were observed feeding on codling moth eggs in the orchard. The thrips also fed on codling moth eggs in confinement, but it was difficult to keep it alive for any length of time. This species is very active and moves rapidly over the foliage when disturbed. While feeding on an egg, however, it can be jarred or shaken considerably without being dislodged. Adult thrips in confinement were given codling moth eggs 1, 3, 4, and 5 days old and some eggs of each age were attacked. Some of the eggs were in a very late stage of development when fed upon. Counts of the thrips in the two orchards showed that the lead arsenate sprays applied on June 10 and June 15 in the commercial orchard decreased both the nymphal and adult populations, whereas in the biological-control orchard, which received no sprays, a rather sharp increase in population was taking place. From June 6 to 18 the average number of thrips occurring on apple foliage in the biological orchard was 258 per 2-hour count. The predatism of eggs placed in the orchard during this period was 16.4 percent. During the same period in the commercial orchard the average number of thrips was 66 and predatism was 6.21 percent.

FOREIGN PLANT QUARANTINES

Pods of Inga sp. infested with Anastrepha distincta.--On October 24, during the customary baggage inspection on Pullman cars crossing the line from Mexico at Nogales, Ariz., a passenger requested permission to take what he called some "bean pods" found in his baggage, through to Canada. He stated that they were intended for a friend of his, a Mexican consul in Victoria, British Columbia. The inspector explained that this material, which proved to be pods of Inga sp., was not enterable and therefore could not be retained by him. Inspection of the Inga pods revealed them to be heavily infested with larvae of *A. distincta* Greene, 157 larvae being taken from 20 pods. One lepidopterous larva, identified as *Stonoma* sp., was also found in this material.

Infested fruit found on special train from Mexico.--On October 15 a special Pullman train of 11 cars, returning to San Francisco after a visit to Mexico City, arrived in Nogales, Ariz. Occupants of the train assured the plant quarantine inspectors that theyknew the danger involved in bringing in foreign fruits and that there were no prohibited fruits on the train. Inspection, however, revealed a Mexican shopping bag, stuck away in a corner of the baggage car and which contained 150 tejocotes, 40 sweet limes, 20 apples, and 20 guavas. No one claimed ownership of this fruit. Examination disclosed the presence of 27 larvae of *Anastrepha ludens* Loew in the sweet limes and 74 larvae and 23 pupae of *Rhagoletis pomonella* Walsh in the tejocotes. Specimens of *Aspidiotus camelliae* Sign. were also present on the tejocotes.

Rare ant found on plant from Mexico.--On July 4 a plant in soil was intercepted at the footbridge in El Paso. Three living ants were taken from this plant and they have been identified as *Cerapachys* (*Parasyscia*) *augustae* Wheeler. According to M. R. Smith, of the Division of Insect Identification, this species is one of our rarest North American ants. No specimens are present in the United States National Museum and, so far as is known, this is the second time the species has ever been collected.

Pink bollworm in okra from Mexico.--On October 12 two larvae of the pink bollworm (*Pectinophora gossypiella* Saund.) were intercepted at Brownsville in okra from Mexico. The interesting point about this interception is that both larvae were taken from edible okra, that is, from okra which was young and tender. It is also interesting to note that, although only 11 okra pods were intercepted, 2 of them were infested.

Inaugural round-trip flight of "California Clipper."--On September 5 the *California Clipper*, one of the new 42-ton planes of the Pan American Airways, completed the inaugural round-trip flight from San Francisco to Auckland, New Zealand, via Honolulu, establishing a route over which will be maintained a regular commercial schedule in the near future. This extension of trans-Pacific air lanes brings Australia, New Zealand, and a new area of the South Seas within days of the coast, instead of weeks, thus increasing the possibility of transporting pests on agricultural commodities. The cooperation of the Pan American Lines in maintaining all possible safeguards against such introductions is assured. The initial return flight carried 12 express shipments of Hawaiian plant material consigned to points in California.

Entomological interceptions of interest.--Living specimens of the fruitfly *Anastrepha mombinpraeoptans* Sein were collected on August 10, 1938, in Malay apple in the field at Bayamon, P. R. A living adult of the cerambycid *Leptostylus testaceus* (Froel.) was taken at Boston on July 3 in a yam in baggage from Trinidad. A living specimen of the lygaeid *Cryphula affinis* (Dist.) was found at Washington, D. C., on April 26 with orchids (*Cattleya*) in express from Colombia. An adult of the weevil *Apion pomonae* F. was intercepted at Chicago, Ill., on April 5, 1938, in a vetch pod in in cargo from Germany. A living specimen of the European earwig (*Forficula* *auricularia* L.) was taken at Philadelphia on May 22 in a cabbage stalk in ship's stores from Spain. A living adult of the scolytid *Xyleborus propinquus* Eichh. was found at Laredo, Tex., on May 23 on a pineapple in cargo from Mexico. Living specimens of *Kakothrips robustus* (Uz.) were intercepted at New York on July 3 on pea pods in ship's stores from Italy. Adults of the weevil *Diocalandra stigmaticollis* (Gyll.) arrived at Honolulu, T. H., on May 16, 1938, in a coconut in cargo from the Philippines. Specimens of the scale insect *Aonidiella comperei* McKenzie were intercepted at San Francisco on February 28 on the cap or stem end of a coconut in cargo from the Philippines. A living adult of the colydiid *Bothrideres dontatus* Chevr. was taken at New Orleans on June 1 under the bark of a mahogany log in cargo from Cuba.

Pathological interceptions of interest.--*Aphelenchoides hunti* Steiner was intercepted at Philadelphia on October 6 in sweetpotatoes from Sierra Leone, adding a new host and a new continent to our records for this nematode. *Botrytis narcissicola* Kleb. was intercepted on numerous shipments of narcissus bulbs from Netherlands during the season. *Cercospora altheina* Sacc. and a rust believed to be *Kuehneola malvicola* (Speg.) Arth. were intercepted on August 25 at Brownsville on *Hibiscus syriacus* from Mexico. A leaf disease of *Odontoglossum* from England intercepted at the Washington inspection house on September 19 was tentatively determined as due to *Cercospora angreci* Gaill. & Feuill. *Cylindrosporium castanicolum* (Desm.) Berl. was intercepted on September 23 at New York on *Castanea sativa* leaves from Italy. *Ditylenchus dipsaci* (Kuhn.) Filipjev was intercepted on September 14 at the Washington inspection house on *Allium azureum* collected in the wild in Netherlands. This host species name is invalid and a synonym of two species; which one is involved has not been learned. *Guignardia aesculi* (Pk.) V. B. Stewart was intercepted on September 11 at New York on horse-chestnut leaves from Nova Scotia. *Heterodera marioni* (Cornu) Goodey was intercepted on September 11 at San Francisco in *Nepenthes ventricosa* from the Philippines. *Melanconium sacchari* Mass. was found on sugarcane cuttings from Sierra Leone on October 17 at Philadelphia. *Microdiplodia palmarum* Died. on *Chamaerops humilis* leaves from Italy was intercepted on August 14 at New York. *Peronospora pisi* (DeBy.) Syd. was found in green peas in stores from England on August 3 at New York. *Phoma conigena* Karst. var. *abieticola* Sacc. was found on the scales of *Picea excelsa* cones in baggage from Germany on August 17 at New York. *Phoma pomi* Pass. was intercepted on September 25 at Brownsville in apples from Mexico. *Puccinia gentianae* (Str.) Link was intercepted at New York on June 27 on gentians from Switzerland. *Puccinia tageticola* Diet. & Holw. was intercepted at Brownsville on August 18 and September 16 on *Tagetes* being brought in as anise for medicinal use. A smut ball found among the florets of plants of *Festuca* sp. from Syria was intercepted on July 12 at New York. The smut spores were much like those of *Tilletia vulipae* P. Magn. *Ustilago grandis* Fries was intercepted at New York on October 16 on *Phragmites communis* from Netherlands.

DOMESTIC PLANT QUARANTINES

Chinch bug survey under way.--In order to obtain more definite data on chinch bug infestations which have been reported as occurring in considerable numbers in certain sections of the Midwest this year, a survey is being conducted, cooperatively with the States, to obtain information on the number of bugs that may enter hibernation. This information is needed to aid in determining the possibility of these insects occurring in outbreak numbers next season. The States which are being so surveyed are Illinois, Iowa, Kansas, Nebraska, Indiana, Ohio, Missouri, and Oklahoma. In Illinois some work has already been done by the State, using a method developed there in recent years. The work in the various infested States is being organized on much the same basis as, and with personnel from, the grasshopper survey conducted this fall by the Division of Domestic Plant Quarantines. The technique utilized has been worked out by the Division of Cereal and Forage Insect Investigations of this Bureau, and personnel from that Division will cooperate in a technical advisory capacity during the survey and in analyzing the accumulated data. Twenty inspectors began the work immediately following a conference at Des Moines, Iowa, on November 3, which was attended by cooperators from Iowa, Illinois, Missouri, and Nebraska and by members of the Divisions of Domestic Plant Quarantines and Cereal and Forage Insect Investigations.

Grasshopper control headquarters moving to Denver.--General headquarters of the grasshopper control project will be moved from Minneapolis to Denver as soon as the final details of the current year's operations and the completion of the fall egg survey will permit. Denver was selected as new headquarters because it is centrally located among the 24 infested Western States in which control of these pests is necessary. A district headquarters will be maintained at Minneapolis. The grasshopper control project of the Division of Domestic Plant Quarantines, under the leadership of B. M. Gaddis, will be under the immediate supervision of W. E. Dove, as field project leader, as heretofore, and under the field directorship of Claude Wakeland, who also acts in a similar capacity over the Salt Lake City headquarters for Mormon cricket control. Office space at Denver has been obtained in the Insurance Exchange Building, 810 Fourteenth Street.

Baiting for lesser migratory grasshopper.--Farmers in the Texas and Oklahoma Panhandles continued to spread bait in October in two counties on the Oklahoma side and several in the Texas area. A little baiting was done in western Kansas for the protection of fall-sown grains and control operations were also continued in Yuma County, Ariz. Federal crews assisted in the work in Oklahoma. Many adults of the second generation of Melanoplus mexicanus Sauss. were present in the early part of October in the various above-mentioned areas, as well as in Nebraska. Freezing temperatures in the latter part of the month destroyed most of them, however, so that few 'hoppers of any species were present in any of the infested region by the end of October, except in Yuma County, Ariz.

Progress in grasshopper survey.--By the close of October the survey of grasshopper eggs throughout the 24 western States in which control operations were carried on in the past field season, was nearing completion, and the task of converting the data into bait-ton estimates for 1940 was well under way at the headquarters office in Minneapolis. For the purpose of devising means for more closely calculating these estimates, a meeting of project leaders and supervisors was held at Minneapolis on October 21 and 22.

Results of Mormon cricket control operations.--Activities for the control of Mormon cricket infestations were conducted in the current field season cooperatively with the States of Idaho, Montana, Nebraska, Nevada, Oregon, South Dakota, Utah, Washington, and Wyoming, and scouting and control were carried on in one county of Colorado. The large reduction in the heavily infested and the moderately infested areas, principally in the States of Montana, Wyoming, and Idaho, may be attributed to the effective power-dusting program in those States. The decrease in Montana alone, which has been the most heavily infested State in the region, amounted to 3½ million acres, reducing the total infestation from 7 3/4 million acres in 1938, to less than 4½ million in 1939. Many areas formerly having heavy or moderate infestations were reduced to light infestations, and in some instances the crickets were so scattered that they no longer threaten crop lands.

October work on white-fringed beetle project.--Although 34 more properties in the vicinity of Monroeville, Ala., were found in October to be infested, white-fringed beetles on the whole were scarce throughout the infested areas. The field force devoted their energies principally to regulatory work. With the harvesting of peanuts and ginning of cotton comprising the chief activity of the rural population, and with nursery-stock shipping beginning in the New Orleans area, patrol inspection was conducted on lines of movement of regulated products. Cotton was fumigated, gin trash inspected, the movement of cottonseed to oil mills was checked with the cooperation of operators, and cars hauling cottonseed were inspected to insure removal of debris. At New Orleans visits in the interest of quarantine enforcement during the winter were made to packing houses, transportation lines, and concerns handling restricted products. Large shipments of plants arriving in the city from various parts of the United States are immediately placed in certified plunging units and held until subsequently reshipped. With the moving of a circus troop out of New Orleans, 6 inspectors were on the ground to see that tent stakes were free from soil and that no hay or other restricted products were being transported. In patrol activities in the New Orleans area in October, over 200 shipments were inspected; 42 were found to be certified, 58 were returned, 18 confiscated, and 86 inspected and certified on the highway. Most of the articles which had not been certified were moved by persons not familiar with the regulations.

Peach mosaic and phony peach control work.--Cooperative inspection for the phony peach and peach mosaic diseases, including the reinspection of nurseries and budwood sources in accordance with standard State quarantines, has been completed for the season in the various infected States, the work in October having been conducted in California, Georgia, Texas, and Oklahoma. In Texas the work has been broadened considerably this year, with 84 counties inspected. The conditions found there showed a checkered picture, with a 50 percent increase in the mosaic disease, and a 40 percent decrease from 1938 in the phony peach disease, as indicated by the number of diseased trees found. Although no peach mosaic was found this year in 4 previously infected counties of that State, the disease was located for the first time in 4 other counties. The phony peach disease was not found this year in 33 previously infected Texas counties. The work in Georgia was conducted in 71 counties during the season, with a reduction of 46 percent in the number of phony trees. Tree removal work in October was carried forward in the 4 above-named States, and in Alabama, Arkansas, South Carolina, Tennessee, and Utah, with the cooperation of the growers.

Phony peach disease reduced.--During the current field season, inspections for the phony peach disease were made in 422 counties. Previously infected properties, as well as those adjacent, were reinspected and the work was also extended into new areas. In the entire 12 infected States, over 58,000 phony trees were found--a reduction of approximately 33 percent from last year. Now that the inspection work has been completed, it is found that the number of counties formerly known to be infected but in which the disease was not found this year when inspected, totals 178.

Sweetpotato-weevil quarantined areas modified.--Since the measures for control and eradication of the sweetpotato weevil infestations were begun in July 1937, jointly with the States of Alabama, Georgia, Mississippi, and Texas, over 500 properties have been released by these States from the restrictions of their quarantines. The number released in each State is as follows: Alabama, 172; Georgia, 50; Mississippi, 280; Texas, 41; or a total of 543.

Work on the sweetpotato-weevil project.--Throughout the month of October, survey and inspection work was conducted in Alabama, Georgia, Mississippi, and Texas, with 13 Federal employees and 24 State men, the work extending into nonregulated areas. No weevils were found outside the present eradication and control areas. Injury caused to sweetpotatoes in Madison County, Tex., where it was rumored that weevils were present, was found to be due to an insect tentatively identified as Typophorus viridicyaneus Crotch. Measures for the eradication of weevils were carried forward, the States of Alabama, Georgia, and Mississippi employing W. P. A. workers to rid fields of volunteer plants. In Alabama 80 properties were so cleaned and 1,079 bushels of escaped tubers were destroyed. In Mississippi a host-free zone is being made along the coast adjoining the present eradication areas. Educational work was stressed in Baldwin and Mobile Counties, Ala.; talks were given before various groups; and at county fairs motion pictures and exhibits were displayed; with an inspector present for the entire 2 weeks, answering questions as to the weevils and their control.

Quarantine enforcement.--Transit inspection work in the month of October resulted in the interception of 266 apparent violations of quarantines. Summarized as to States to which these shipments were moving, it is found that with the exception of 1 State--New York--more violations were found consigned to California than to any other State. Of the 26 violations moving to California, 13 were intercepted at Chicago and the others at Kansas City, Omaha, Boston, Philadelphia, and New York. A shipment in violation of the white-fringed beetle quarantine, consigned to the State of New York, was intercepted at New York City. State inspectors of Illinois and Minnesota rendered assistance on the transit-inspection work in October, and Japanese beetle inspectors examined shipments in transit at Pittsburgh and New York. The State of California systematically reports all violations of Federal quarantines that reach that State, and Florida State inspectors at Jacksonville conduct transit-inspection activities for the enforcement of Federal and State quarantines.

Citrus-canker work stepped up.--With the approach of winter and the defoliation of trees facilitating the work of finding small escaped citrus trees in competing vegetation, the inspection personnel has been increased to 10, including 1 Texas State inspector and 3 from other projects of the

Division. The October work of inspecting orange and grapefruit trees in groves or dooryards in the city of Houston, Tex., and vicinity, and at League City, Tex., resulted in finding no citrus canker. W. P. A. laborers removed over 13,000 abandoned trees in October.

CONTROL INVESTIGATIONS

A method of applying rotenone-containing materials.--W. N. Sullivan, E. R. McGovran, and J. H. Fales, in cooperation with L. D. Goodhue, of Insecticide Investigations, have developed a method of applying rotenone and rotenone-bearing materials as insecticides. By this method the rotenone-containing material is first dissolved in a suitable solvent such as safrole or acetone, placed in a Devilbiss atomizer and sprayed on a hot plate. A temperature of about 400° C. is maintained at the point of contact of liquid and hot plate, which produces a dense smoke or fog containing the insecticidal material. A fan is used as an aid in distributing the smoke. Preliminary tests against the housefly indicate excellent killing power for rotenone applied in this form. An oleo resin containing 25 percent pyrethrins, alone and in combination with rotenone, also gave very good results. This method of application of rotenone has many advantages over other methods: (1) The smoke containing rotenone is very stable; (2) is not readily adsorbed on surfaces such as walls or floors; (3) high efficiency in respect to amount of material used and amount of solvent required; (4) probably less danger to health of plants; and (5) ease of confinement in respect to most other fumigants. Although this method is still in the experimental phase, it is believed that it has possibilities for use in the control of insects.

INSECTICIDE INVESTIGATIONS

Dennis patent on cube adjudicated.--In 1938 the American Cube Syndicate brought suit against L. E. Pitner and partners doing business as the Agicide Laboratories, Milwaukee, Wis., alleging infringement of United States Reissue Patent 18,667. This patent covers the use as an insecticide and vermifuge of ground cube root with the fibrous element removed. This reissue patent corrected information concerning the botanical origin of cube which was given in the original patent. This suit was heard in the United States District Court for the eastern district of Wisconsin at Milwaukee. N. E. McIndoo, R. C. Roark, John E. Dudley, Jr., of this Bureau appeared as witnesses to testify concerning the chemical and botanical relationships of cube (Lonchocarpus), derris, and tephrosia, the early use of cube as an insecticide, and its present large-scale use, especially against the pea aphid. The judge ruled in favor of the American Cube Syndicate. An appeal was taken which was heard in the United States Circuit Court of Appeals for the Seventh Circuit in Chicago, Ill. The Circuit Court overruled the decision and decided that the Dennis patent was void for lack of originality on the part of the patentee and for lack of invention over the art. The American Cube Syndicate petitioned the United States Supreme Court for a writ of certiorari in this patent action, but on November 7, 1939, the Supreme Court refused to review the case. Thus the final word has been said in this case. The final adjudication of this patent is of considerable interest to entomologists, inasmuch as about 2,500,000 pounds of cube are imported annually for use in the preparation of insecticidal dusts and sprays. The American Cube Syndicate, owners of the patents, had been demanding a royalty of 1 cent a pound for the use of cube as an insecticide, and on January 1, 1939, had increased this royalty to 1½ cents a pound. The saving to the American public by this decision, declaring the patent invalid, amounts to at least $25,000 a year.

BEE CULTURE

Parafoulbrood organism found in comb from Indiana.--The first instance in which *Bacillus para-alvei*, the causative organism of parafoulbrood, has been definitely identified in a disease sample sent to the Beltsville, Md., laboratory from a northern State occurred in September. The sample originated in Indiana. This disease had previously been reported only from limited sections of North Carolina, South Carolina, Georgia, and Florida. The first detailed description of parafoulbrood was made as the result of a cooperative investigation by the Bureau and State Plant Board of Florida a few years ago. A complete history of the Indiana case has not yet been obtained.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

European ground beetle reported from North America.--On at least two occasions during the past year quarantine inspectors at Seattle, Wash., have taken the European carabid *Acupalpus meridianus* (L.) on cargoes of British ships from Canada. So far as known, *A. meridianus* has not heretofore been reported from North America but, in view of the circumstances under which the Seattle interceptions were made, it seems probable that the species is established in southwestern Canada and possibly also in northwestern United States. This ground beetle is widely distributed in Europe, but appears to be of no particular economic significance.

A new cecidomyiid pest of phlox.--Late in 1937 some Cecidomyiidae were received from C. R. Neiswander, of the Ohio Experiment Station at Wooster, Ohio, with the report that considerable damage was being caused to phlox by these insects. Definite identification could not be made on the basis of the original material and a number of lots were submitted by Dr. Neiswander subsequently, accompanied by detailed notes on field and laboratory observations. The early sendings were found to consist of a species considered predatory, rather than phytophagous, and it was thought possible that some form other than a cecidomyiid might be responsible for the injury. More recently, however, Dr. Neiswander has succeeded in obtaining a phytophagous cecidomyiid also in the course of his rearing work. He has, furthermore, determined that the latter is definitely responsible for the injury to phlox and has supplied some excellent series of both species with associated larvae. After extended study of this material, C. T. Greene has concluded that both forms are undescribed.

Review of a genus of hymenopterous parasites.--G. Stuart Walley, of the Division of Entomology, Canadian Department of Agriculture, has recently returned the National Museum specimens of the ichneumonid genus *Campoplegidea*, having just completed a revision of the North American species. Mr. Walley recognized 80 species of *Campoplegidea*, of which the Museum has representatives of 66 species. Of these 66 species, 33 are new and are all represented by type material, 20 by the holotypes.

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Notes on the National ant collection.--One of the largest and most valuable collections of ants recently received by the National Museum on an exchange basis was that sent by John Clark, of the National Museum of Melbourne, Australia. It totaled 145 species of Australian ants, of which 120 were new to our collections, and 26 were represented by paratypes. A recent and very interesting discovery was the finding in the old Theodore Pergande collection of the National Museum of a single worker of an inquilinous ant, *Epipheidole inquilina* Wheeler, formerly believed to be workerless. From available information it appears that the ant was collected at West Point, Nebr., by Lawrence Bruner. The genus *Epipheidole* was created by Wheeler for specimens of *inquilina* (male, queen) which he found living in several nests of a harvesting ant, *Pheidole pilifera* var. *coloradensis* Emery, near Colorado Springs, Colo.

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